

Chapter 4 Removal and Replacement Procedures

This chapter describes removal and replacement procedures of most internal components.

- “Service Considerations” on page 62
- “Pre-Disassembly Procedures” on page 66
- “System Board Components” on page 67
- “Removal and Replacement of Components” on page 68

Service Considerations

The following sections discuss service considerations that should be reviewed and practiced before removing and replacing any system components.



WARNING! When lifting or moving the workstation, do not use the front bezel as a handle or lifting point. Lifting the workstation from the front bezel or lifting it incorrectly can cause the unit to fall and harm the user and damage the workstation. To properly and safely lift the workstation, lift it from the bottom of the unit.

Read Cautions, Warnings and Safety Precautions

For your safety, you must review the [“Important Safety Warnings” on page ix](#) before accessing the components of the workstation. Also, review the *Safety and Regulatory Guide* that came with your workstation for more information.

Electrostatic Discharge Information

A sudden discharge of static electricity from your finger or other conductor can destroy static-sensitive devices or microcircuitry. Often the spark is neither felt nor heard, but damage occurs. An electronic device exposed to electrostatic discharge (ESD) might not appear to be affected at all and can work perfectly throughout a normal cycle. The device can function normally for a while, but it has been degraded in the internal layers, reducing its life expectancy.

Networks built into many integrated circuits provide some protection, but in many cases, the discharge contains enough power to alter device parameters or melt silicon junctions.

Generating Static

The following table shows that:

- Different activities generate different amounts of static electricity.
- Static electricity increases as humidity decreases.

Table 4-1 Static Electricity

Event	Relative Humidity		
	55%	40%	10%
Walking across carpet	7,500 V	15,000 V	35,000 V
Walking across vinyl floor	3,000 V	5,000 V	12,000 V
Motions of bench worker	400 V	800 V	6,000 V
Removing bubble pack from PCB	7,000 V	20,000 V	26,500 V
Packing PCBs in foam-lined box	5,000 V	11,000 V	21,000 V

NOTE 700 volts can degrade a product.

Preventing Electrostatic Damage to Equipment

Many electronic components are sensitive to ESD. Circuitry design and structure determine the degree of sensitivity. The following packaging and grounding precautions are necessary to prevent damage to electric components and accessories.

- Transport products in static-safe containers, such as tubes, bags, or boxes to avoid hand contact.
- Protect all electrostatic parts and assemblies with conductive or approved containers or packaging.
- Keep electrostatic sensitive parts in their containers until they arrive at static-free stations.
- Place items on a grounded surface before removing them from their container.
- When handling or touching a sensitive component or assembly, ground yourself by touching the chassis.
- Avoid contact with pins, leads, or circuitry.
- Place reusable electrostatic-sensitive parts from assemblies in protective packaging or conductive foam.

Personal Grounding Methods and Equipment

Use the following equipment to prevent static electricity damage to equipment:

- Wrist straps are flexible straps with a maximum of one-megohm \pm 10% resistance in the ground cords. To provide a proper ground, wear the strap against bare skin. The ground cord must be connected and fit snugly into the banana plug connector on the grounding mat or workstation.
- Heel straps, toe straps, and boot straps can be used at standing workstations and are compatible with most types of shoes or boots. On conductive floors or dissipative floor mats, use them on both feet with a maximum of one-megohm \pm 10% resistance between the operator and ground.

Table 4-2 Static Shielding Protection Levels

Method	Voltage
Antistatic plastic	1,500
Carbon-loaded plastic	7,500
Metallized laminate	15,000

Grounding the Work Area

To prevent static damage at the work area:

- Cover the work surface with approved static-dissipative material. Provide a wrist strap connected to the work surface and properly grounded tools and equipment.
- Use static-dissipative mats, foot straps, or air ionizers to give added protection.
- Handle electrostatic sensitive components, parts, and assemblies by the case or PCB laminate. Handle them only at static-free work areas.
- Turn off power and input signals before inserting and removing connectors or test equipment.
- Use fixtures made of static-safe materials when fixtures must directly contact dissipative surfaces.
- Keep work area free of nonconductive materials, such as ordinary plastic assembly aids and Styrofoam.

- Use field service tools, such as cutters, screwdrivers, and vacuums, that are conductive.

Recommended Materials and Equipment

Materials and equipment that are recommended for use in preventing static electricity include:

- Antistatic tape
- Antistatic smocks, aprons, or sleeve protectors
- Conductive bins and other assembly or soldering aids
- Conductive foam
- Conductive tabletop workstations with ground cord of one-megohm \pm 10% resistance
- Static-dissipative table or floor mats with hard tie to ground
- Field service kits
- Static awareness labels
- Wrist straps and footwear straps providing one-megohm \pm 10% resistance
- Material handling packages
- Conductive plastic bags
- Conductive plastic tubes
- Conductive tote boxes
- Opaque shielding bags
- Transparent metallized shielding bags
- Transparent shielding tubes

Tools and Software Requirements

To service the workstation:

- Torx T-15 screwdriver or Flat-bladed screwdriver (can be used in place of the Torx screwdriver)
- Diagnostics software

Screws

The screws used in the workstation are not interchangeable. They might have standard or metric threads and might be of different lengths. If an incorrect screw is used during the reassembly process, it can damage the unit. HP strongly recommends that all screws removed during disassembly be kept with the removed part, then returned to their proper locations.

Special Handling of Components

The following components require special handling when servicing the workstation.

Cables and Connectors

Cables must be handled with care to avoid damage. Apply only the tension required to seat or unseat the cables during insertion or removal from the connector. Handle cables by the connector or pull strap

whenever possible. In all cases, avoid bending or twisting the cables, and be sure that the cables are routed in such a way that they cannot be caught or snagged by parts being removed or replaced.



CAUTION When servicing this workstation, be sure that cables are placed in their proper location during the reassembly process. Improper cable placement can damage the workstation.

Hard Drives

Handle hard drives as delicate, precision components, avoiding all physical shock and vibration. This applies to failed drives as well as replacement spares.

- If a drive must be mailed, place the drive in a bubble-pack mailer or other suitable protective packaging and label the package “Fragile: Handle With Care.”
- Do not remove hard drives from the shipping package for storage. Keep hard drives in their protective packaging until they are actually mounted in the workstation.
- Avoid dropping drives from any height onto any surface.
- If you are inserting or removing a hard drive, turn off the workstation. Do not remove a hard drive while the workstation is on or in Hibernate mode.
- Before handling a drive, be sure that you are discharged of static electricity. While handling a drive, avoid touching the connector. For more information about preventing electrostatic damage, refer to [“Electrostatic Discharge Information” on page 62](#).
- Do not use excessive force when inserting a drive.
- Avoid exposing a hard drive to liquids, temperature extremes, or products that have magnetic fields such as monitors or speakers.

Lithium Coin Cell Battery

The battery that comes with the workstation provides power to the real-time clock and has a minimum lifetime of about three years.

For instructions on battery removal and replacement, see the [“Battery” section on page 86](#).



WARNING! This workstation contains a lithium battery. There is a risk of fire and chemical burn if the battery is handled improperly. Do not disassemble, crush, puncture, short external contacts, dispose in water or fire, or expose it to temperatures higher than 140 F (60 C).



CAUTION Batteries, battery packs, and accumulators should not be disposed of together with the general household waste.

Pre-Disassembly Procedures

Perform the following steps before servicing the workstation:

- 1 Remove/disengage any security devices that prohibit opening the workstation.
- 2 Close any open software applications.
- 3 Remove any diskette or compact disc from the workstation.
- 4 Exit the operating system.
- 5 Turn off the workstation and any peripheral devices that are connected to it.
- 6 Remove/disengage any security devices that prohibit opening the workstation.



CAUTION Turn off the workstation before disconnecting any cables.



CAUTION The cooling fan is off **only** when the workstation is turned off or the power cable has been disconnected. The cooling fan is always on when the workstation is in the “On” or “Standby” modes. You must disconnect the power cord from the power source before opening the workstation to prevent system board or component damage.

- 7 Disconnect the power cord from the electrical outlet and then from the workstation.
- 8 Disconnect all peripheral device cables from the workstation.

System Board Components

The following image shows the system board connectors and sockets on the HP Workstation xw8200.

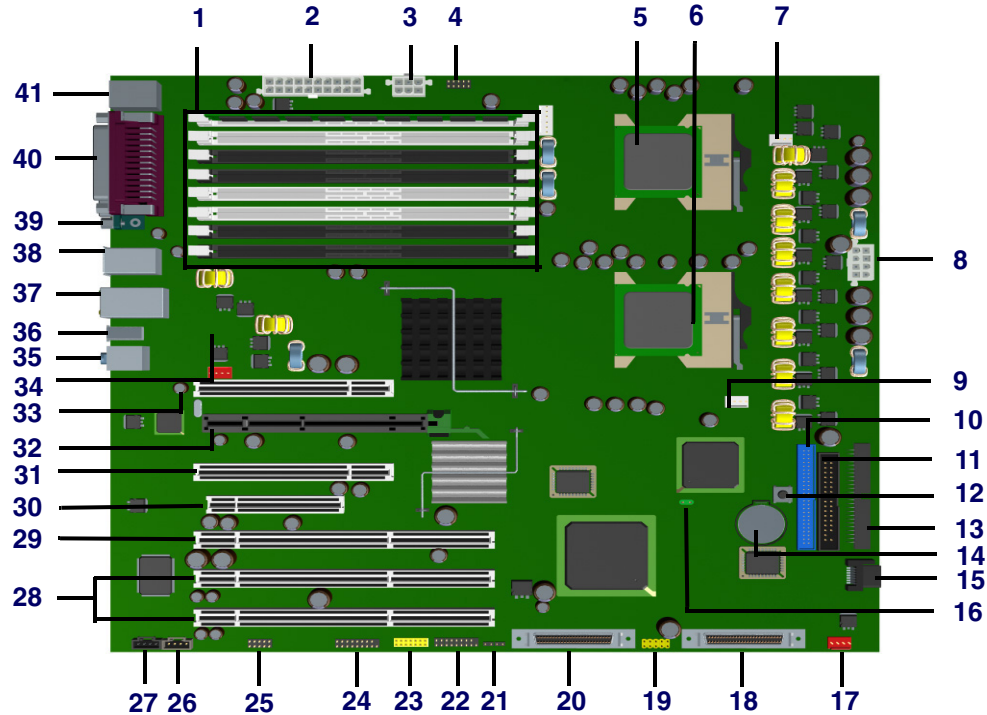


Table 4-3 System Board Components

1	Memory module pairs	12	Clear CMOS button	23	Front IEEE 1394	34	Rear chassis fan
2	Main power	13	Secondary IDE*	24	Trusted platform module	35	Audio
3	Auxiliary power	14	Battery	25	Front audio	36	IEEE 1394
4	MultiBay	15	Serial ATA	26	Auxiliary audio	37	Network/USB
5	Processor 1	16	Password header	27	CD audio	38	USB
6	Processor 2	17	Front chassis fan	28	PCI-X 100	39	Serial
7	Processor 1 fan	18	Primary SCSI	29	PCI-X 133	40	Parallel
8	Processor power	19	Front USB	30	PCI Express x8***	41	PS/2 Keyboard/mouse
9	Processor 2 fan	20	Secondary SCSI	31	PCI		
10	Primary IDE**	21	Hard disk activity LED	32	PCI Express x16 (graphics)		
11	Diskette drive	22	Front control panel	33	PCI		

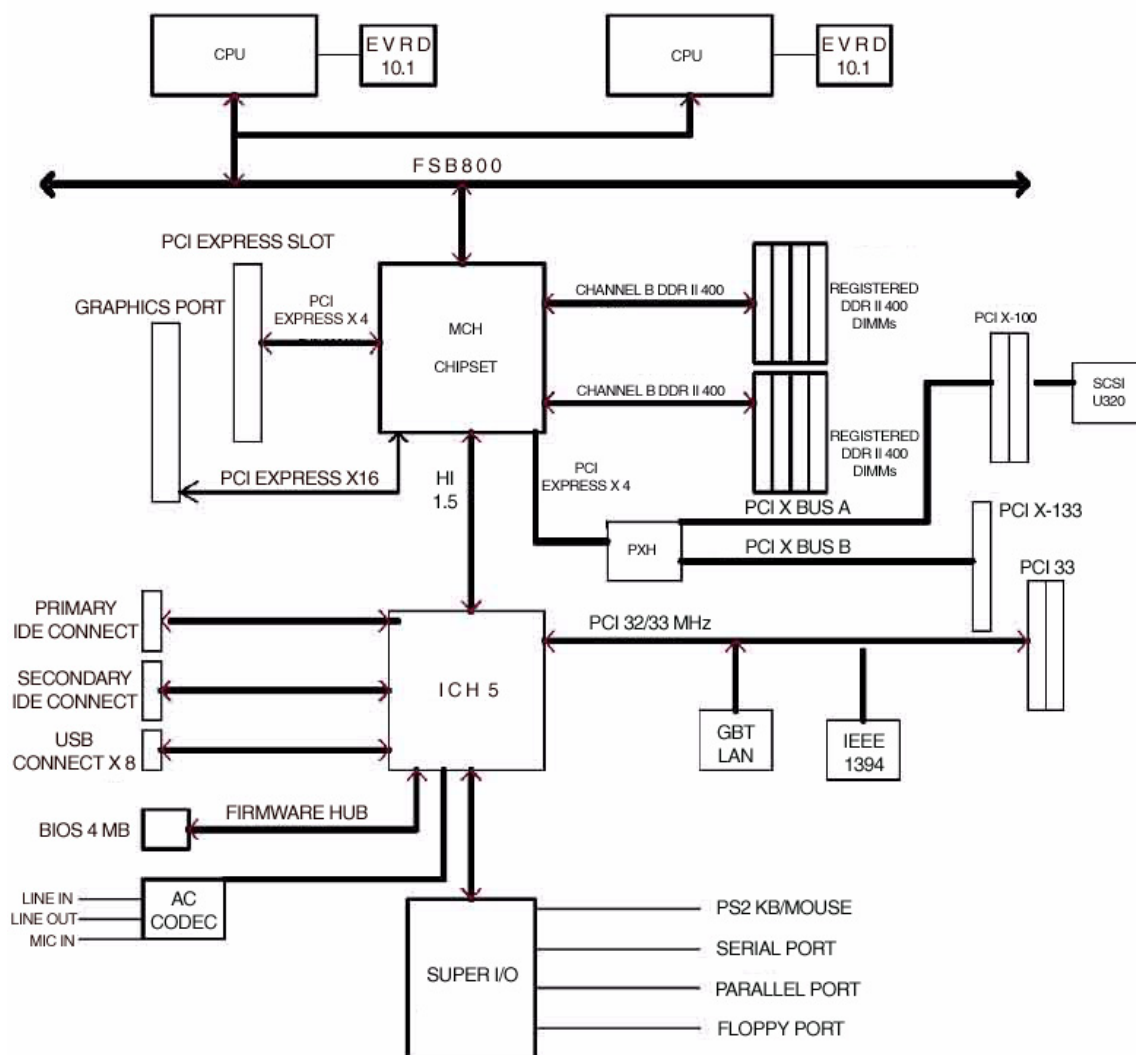
*The Secondary IDE connector is generally used for optical drives.

**The Primary IDE connector is generally used for hard drives

***The PCI Express x8 prime is a PCI-Express x8 connector that has x4 bandwidth.

System Board Architecture

The following image shows the HP Workstation xw8200 block diagram.



Removal and Replacement of Components

This section discusses the procedures necessary to remove and install various hardware components on your workstation. Review the safety and precautions and the [“Service Considerations” on page 62](#), as well as the *Safety and Regulatory Guide*, before servicing or upgrading your system.

- 1 Read all safety information and precautions.
- 2 Locate and clear a suitable work area.
- 3 Shut down the system and remove power from the unit.
- 4 Gather your tools.
- 5 Service your unit.
- 6 Restore power to your unit.

Disassembly Order

Use the following table to determine the sequence in which to remove the major components.

Pre-Disassembly (page 66)	
Locks (page 70)	
Access Panel (page 71)	
	Access Panel Sensor (page 72)
	Front Bezel (page 71)
	Front Panel I/O Device Assembly (page 73)
	Power Button and Front Speaker (page 74)
	Optical Drive (page 87)
	Diskette Drive (page 89)
	Bezel Blanks (page 72)
	Power Supply (page 74)
	System Fan (page 75)
	Memory (page 76)
	Front Fan Removal (Optional) (page 85)
	Battery (page 86)
	Hard Drive (page 91)
	CPU Heatsink (page 96)
	Processor (page 99)
	PCI Card Support (page 81)
	PCI Retainer (page 83)
	PCI or PCI Express card (page 84)
	CPU Heatsink (page 96)
	Processor (page 99)
	System Board (page 101)

Security Lock (Optional)

If a security padlock is installed, remove it before servicing the unit. To remove the padlock, unlock it and slide it out of the padlock loop as shown in the following image.



Cable Lock (Optional)

If a cable lock is installed, remove it before servicing the unit. To remove the cable lock, unlock it and pull it out of the cable lock slot as shown in the following image.



Universal Clamp Lock (Optional)

If a universal clamp lock is installed, remove it before servicing the unit.

To remove the universal clamp lock:

- 1 Unlock the device and remove the locking mechanism.



- 2 Remove the screw attaching the lock to the chassis.



Access Panel

Before accessing the internal components of the workstation, the access panel must be removed.

To remove the access panel:



WARNING! Before removing the workstation access panel, be sure that the workstation is turned off and that the power cord is disconnected from the electrical outlet.

- 1 Disconnect power from the system ([page 66](#)).
- 2 If necessary, unlock the access panel ([page 70](#) or [page 70](#)). The keys are on the rear panel ([page 18](#)).
- 3 Pull up on the handle and lift off the cover.



To replace the access panel, slide the cover back on until it snaps into place.

Front Bezel

To remove the bezel:

- 1 Lift up on the three **1** tabs located on the front bezel.

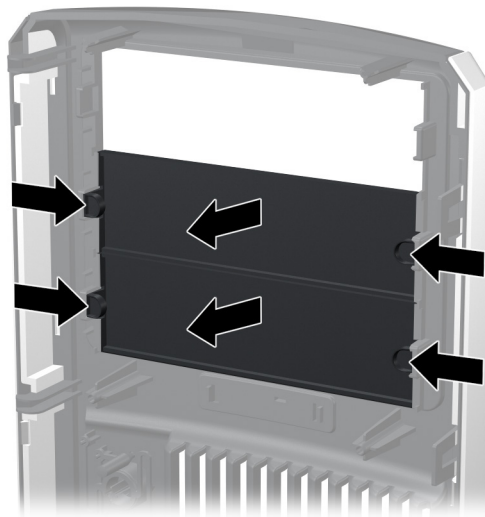
- 2 Rotate the front bezel away 2 from the chassis and remove the bezel.



Bezel Blanks

To remove the bezel blanks:

- 1 Disconnect power from the system ([page 66](#)) and remove the front bezel ([page 71](#)).
- 2 Remove the bezel blanks by squeezing in on the tabs and pushing the bezel blanks out.



Access Panel Sensor

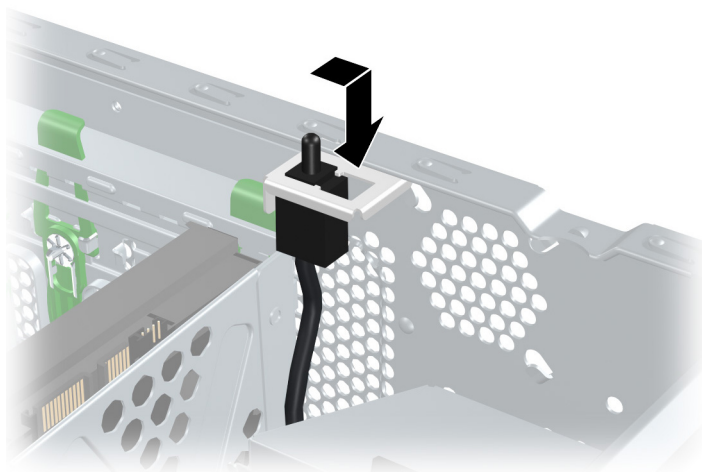
To remove the access panel sensor:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 Disconnect the white 1x3 access panel sensor connector from the inline connector attached to the front panel harness.
- 3 Slide the access panel sensor forward.



CAUTION Be careful when sliding the access panel sensor forward. The access panel sensor bracket and the chassis contain sharp edges that present a safety hazard.

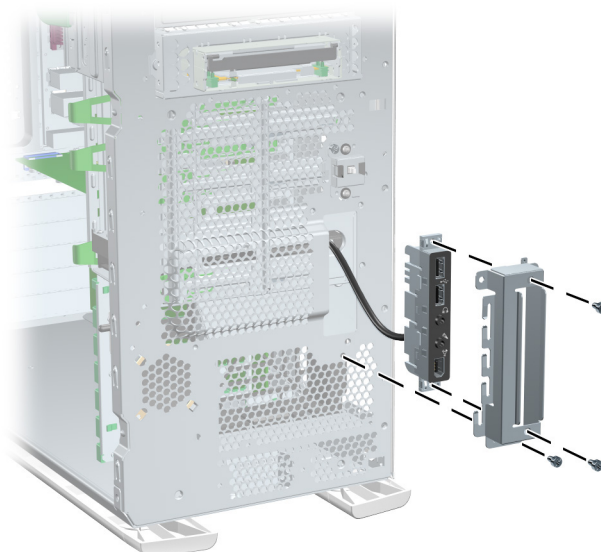
- 4 Push the access panel sensor down and remove it from the chassis.



To replace the access panel sensor, reverse the previous steps.

Front Panel I/O Device Assembly

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and remove the front bezel ([page 71](#)).
- 2 Unlatch the plastic snap that secures the cables inside the chassis and disconnect the front panel I/O device assembly cables from the system board.
- 3 Remove the screws that hold the front panel I/O device assembly and bracket to the chassis and remove the screws that hold the front panel I/O device assembly to the bracket.
- 4 Pull the front panel I/O device assembly out about two inches away from the chassis.
- 5 Separate the bracket away from the front panel I/O device assembly.





WARNING! The next step requires the removal of cables through the chassis. Some edges on the chassis might be sharp. Be careful when removing these cables.

- 6 Slide the front panel cables through the chassis and out the front of the unit.

To replace the front panel I/O device assembly, reverse the previous steps.

Power Button Assembly and System Speaker

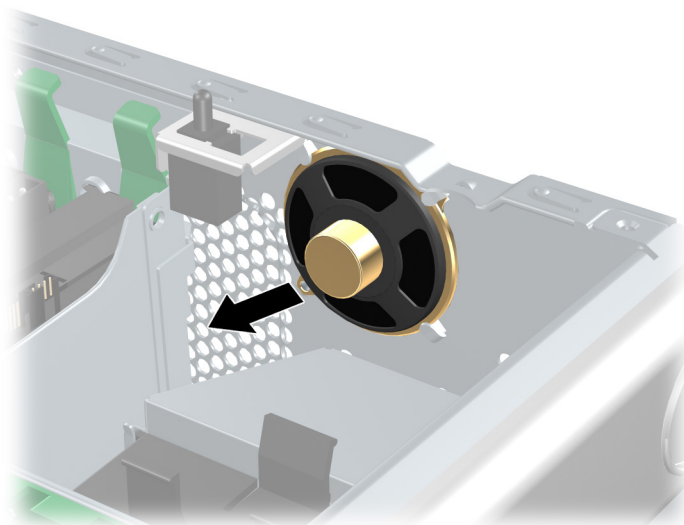
The power button and the system speaker are part of the same assembly.

To remove the power button:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), remove the front bezel ([page 71](#)), and remove the front panel I/O device assembly ([page 73](#)).
- 2 Disconnect the power button assembly cable from the system board.
- 3 Disconnect the speaker wire and the hood sensor from the in-line connectors on the power button assembly cable.
- 4 Remove the screw that secures the power button assembly to the chassis.
- 5 Pull the power button assembly away from the chassis.
- 6 Slide the power button assembly out from the front of the chassis.

To remove the speaker:

- 1 Disconnect the speaker cable from the in-line front panel I/O device assembly cable, if you have not already done so.
- 2 Slide the speaker away from the three flanges and remove it from the chassis.



Power Supply

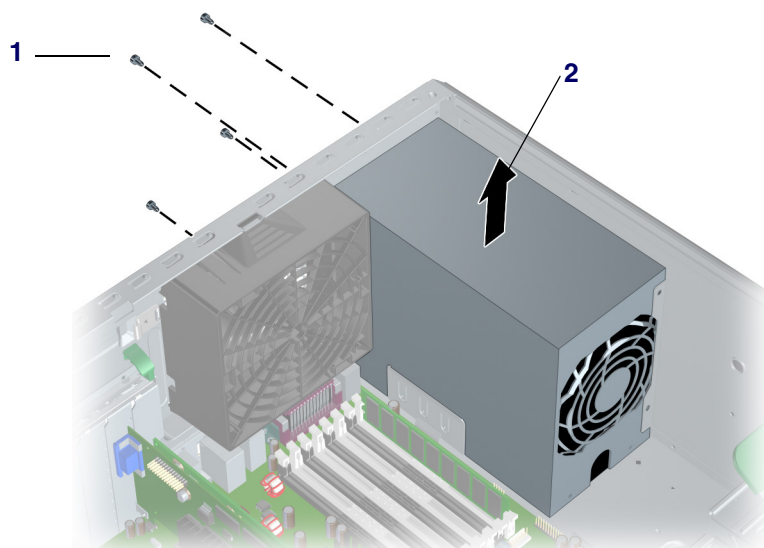
- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)) and lay the workstation on its side with the system board facing up.
- 2 Disconnect the power supply from the system board.

- 3 Disconnect the optical drives, diskette drive, hard drives, and graphics card (select models only) from the power supply.



CAUTION Be sure you can differentiate which power cable was disconnected from the PCI Express x16 graphics card and which power cable was disconnected from the system board. These two cables look very similar. The PCI Express power cable has a black connector and the power cable has a white connector. When power is present, you must NEVER connect the PCI Express power cable to the system board. If you do so, the system board may be damaged and your warranty voided. To see a picture of the PCI Express cable and where it must be connected, refer to the [“PCI or PCI Express Installation” section on page 84](#).

- 4 Remove the four screws **1** from the back panel.
- 5 Slide the power supply toward the front and lift up **2** to remove it from the chassis.



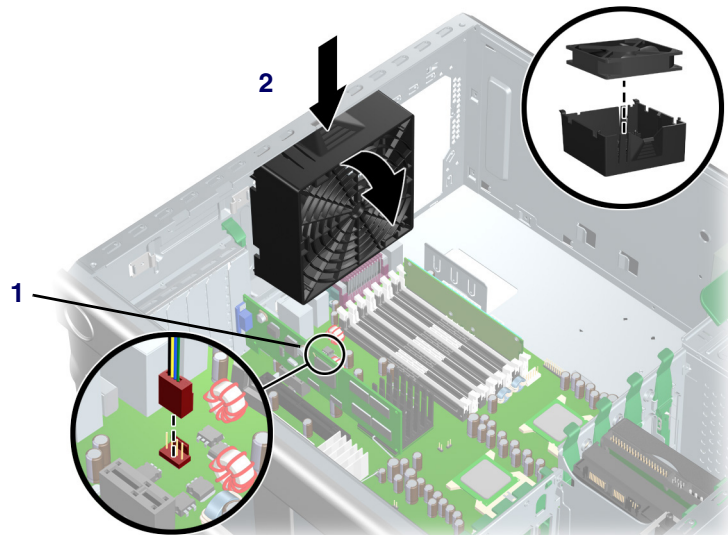
To install the power supply, reverse the previous steps.

System Fan

To remove the system fan:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 Disconnect the fan plug **1** from the system board.

- 3 Press in on the ribbed portion of the fan housing **2**, rotate the fan housing down, and lift it out of the chassis.



To replace a system fan, reverse the previous steps.



CAUTION When installing the system fan, be sure that the fan is situated so that the airflow direction is going out of the chassis.

Memory

Memory Module Features

- 8 memory slots for DIMMS
- 256-MB, 512-MB, 1-GB and 2-GB pairs
- 16 GB maximum configuration (4 GB maximum on Windows and 16 GB maximum on Linux)
- Supports single-channel or dual-channel DIMMs
- Supports DDR2-400
- No support for mirroring, no spare DIMM support
- Standard ECC (72-bit ECC)
- Enhanced ECC (x4 SDDC or 144-bit ECC) in dual-channel mode when all DIMMs are x4
- DED retry

Memory Module Requirements

- Use only industry-standard, registered, PC2-3200 DIMMs
- Match DIMM pairs by size and type
- No support for unbuffered memory

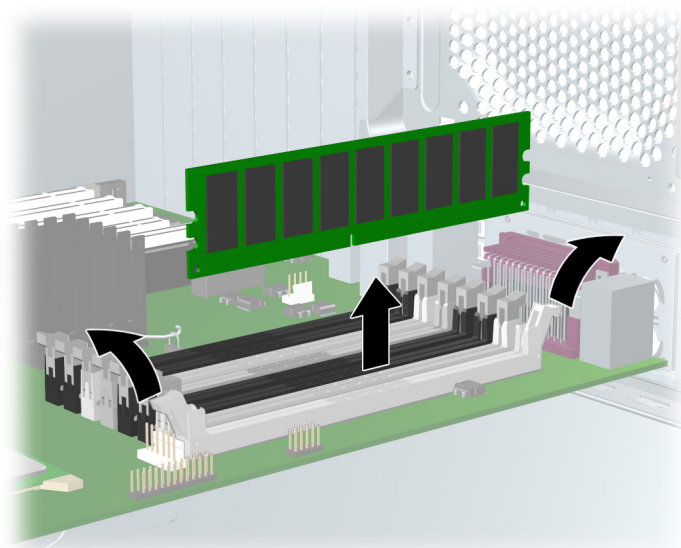
Removing Memory Module

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.



CAUTION To ensure that memory modules are not damaged during removal or installation, power off the workstation and unplug the power cord from the AC power outlet. Wait until the LED on the back of the power supply turns off before removing memory. If you do not unplug the power cord while installing memory, your memory modules might be damaged and the system will not recognize the memory changes.

- 2 Gently push outwards on the socket levers.
- 3 Lift the DIMM straight up and remove it from the unit.



NOTE DIMMs and the DIMM sockets are keyed for proper installation. Be sure these guides line up when installing a DIMM.

To install a memory module, reverse the previous steps and follow the guidelines in the next section.

Installing Memory Module

You must load memory modules in valid configurations:

- Load DDR SDRAM as matched pairs. For example, if you place a memory module of 1 GB in slot 1, you must also insert a 1-GB module in slot 2.
- Load the memory module pairs in order of size, from smallest to largest, beginning with memory module pair A (closest to PCI slots). For example, if you have 3.5 GB of memory composed of two 256-MB modules, two 512-MB modules and two 1-GB modules, load the 256-MB modules in memory module pair A, the 512-MB modules in pair B, and the 1-GB modules in memory module pair C.
- Install the DIMM in socket 1 if only installing one DIMM.

- Install the first matched DIMM pair in socket set A.
- Install subsequent matched DIMM pairs in sets B, then C, and lastly D (farthest from power supply).



The BIOS generates warnings/errors on invalid memory configurations.

- In DDR2 mode, dual-rank DIMMs are placed farther from the Memory Controller Hub (MCH) than single-rank DIMMs.
- If there is no way to obtain a valid memory configuration by disabling some of the plugged-in memory, the BIOS will halt with a diagnostics 2004 code for memory error (4 beeps/blinks).
- If the BIOS can find a valid memory configuration by disabling some of the plugged-in memory, it will do so and will report a warning during POST ("215-mismatched memory"). The system can still be booted in this condition.

Peripheral Component Interconnect (PCI) Slots

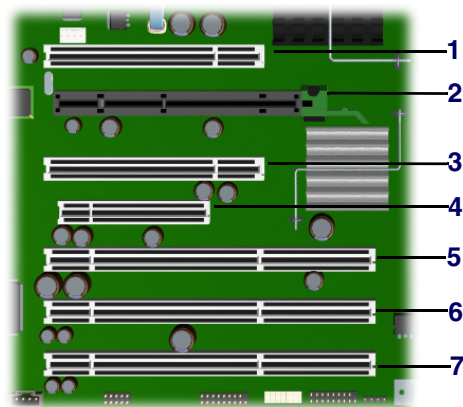


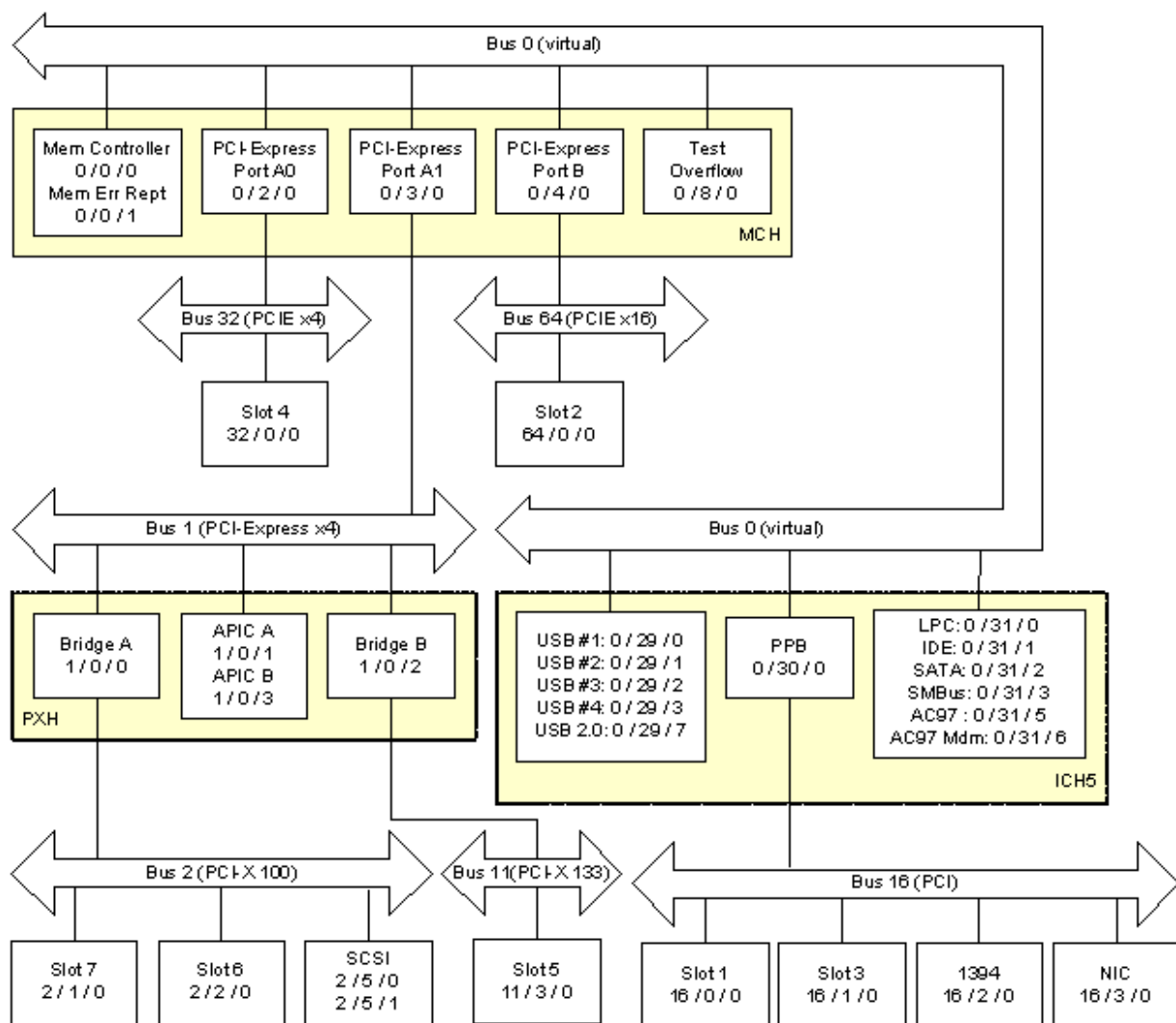
Table 4-4 PCI Slot Types

Slot	Type	Ref
1	PCI	J21
2	PCI Express x16	J41
3	PCI	J20
4	PCI Express x4	J31
5	PCI-X 133	J22
6	PCI-X 100	J23

Table 4-4 PCI Slot Types

Slot	Type	Ref
7	PCI-X 100	J24

PCI Bus Layout

**Table 4-5** PCI Device List

Device	Bus#	Dev#	Fn#
MCH	0	0	0
MCH Errors	0	0	1
MCH EXP A (Slot 1)	0	2	0
MCH EXP A1 (PXH)	0	3	0
MCH EXP B (Slot 2)	0	4	0

Table 4-5 PCI Device List

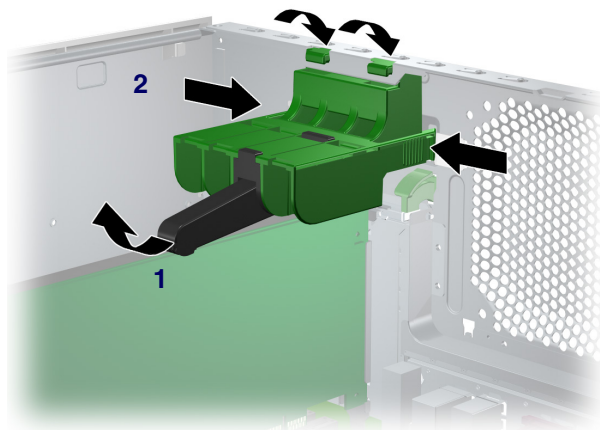
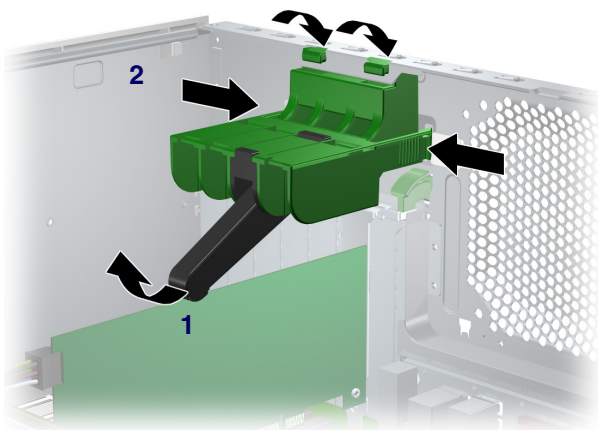
Device	Bus#	Dev#	Fn#
MCH Test Overflow	0	8	0
ICH5 USB #1	0	29	0
ICH5 USB #2	0	29	1
ICH5 USB #3	0	29	2
ICH5 USB #4	0	29	3
ICH5 USB 2.0	0	29	7
ICH5 PPB (PCI slots)	0	30	0
ICH5 LPC	0	31	0
ICH5 IDE	0	31	1
ICH5 SATA	0	31	2
ICH5 SMBus (1)	0	31	3
ICH5 Audio	0	31	5
ICH5 Modem (2)	0	31	6
PXH Bridge A	1	0	0
PXH IOAPIC A	1	0	1
PXH Bridge B	1	0	2
PXH IOAPIC B	1	0	3
Slot 7 (PCI-X 100 PXHA)	2	1	0
Slot 6 (PCI-X 100 PXHA)	2	2	0
SCSI #A	2	5	0
SCSI #B	2	5	1
Slot 5 (PCI-X 133 PXHB)	11	3	0
Slot 1 (PCI)	16	0	0
Slot 3 (PCI)	16	1	0
1394	16	2	0
Intel NIC	16	3	0
Slot 4 (PCI Express x4 EXP A)	32	0	0
Slot 2 (PCI Express x16 EXP B)	64	0	0

PCI Card Support

For added protection, some cards have PCI holders installed to prevent movement during shipping.

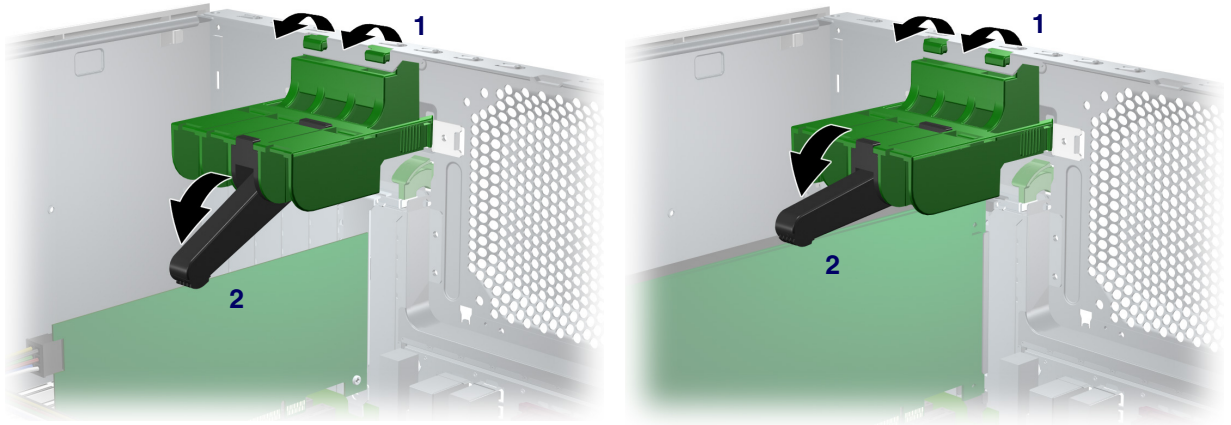
To remove the card support:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 For short or tall PCI cards, lift up on the holder arm **1** with one hand and press in on the sides **2** of the holder and rotate it out of the chassis.



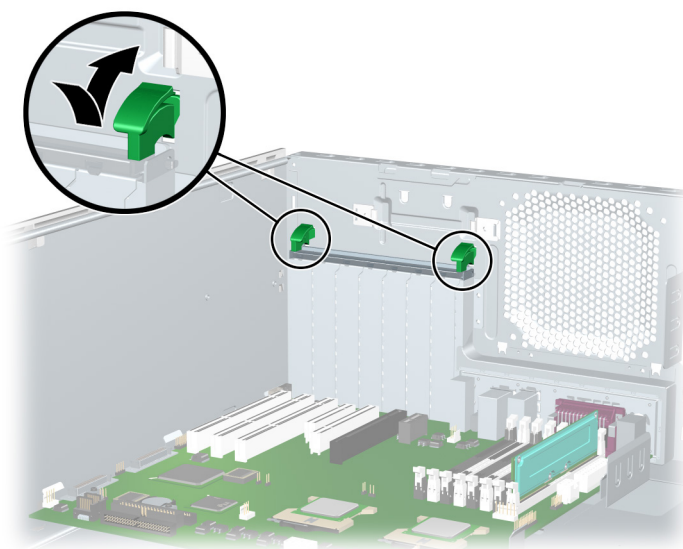
To install the card support:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 For short or tall PCI cards, attach the lips of the support arm **1** under the slots on the rear of the chassis, then rotate the card support down until the black part of the arm **2** supports the card.



PCI Retainer

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 Open the PCI retainer by pressing down on the two green clips at the ends of the retainer and rotating the retainer towards the back of the system.



PCI Express

PCI Express is a new hardware interconnect standard (for example, I/O slots). PCI Express is a point-to-point architecture and uses a serial data transmission protocol. A single PCI Express lane consists of 4 wires and is capable of transmitting 250 MB/sec in a single direction or 500 MB/sec in both directions simultaneously. This bandwidth is not affected by what is happening on other PCI Express buses or legacy PCI/PCI-X buses (provided that total bandwidth can be handled by the CPU and the memory subsystem.) The transmission protocol is somewhat similar to that used for a LAN connection and contains error correction and detection, packet addressing and other network features.

PCI Express improves system attributes. PCI Express enables a low-power, scalable, high-bandwidth communication path with a small number of connections (wires) compared to traditional parallel interfaces (e.g. PCI).

The PCI Express IO slots can support other PCI Express cards with lesser bus bandwidth than what is physically defined for the slot. Use the following table to determine compatibility.

For example, a PCI Express x8 card does not work in a PCI Express x1 slot, but a PCI Express x1 card works in a PCI Express x8 slot.



NOTE The HP Workstation xw8200 contains one PCI Express x8 slot that supports x4 bandwidth. If a PCI Express x8 card is plugged into the PCI Express x8 slot, the card runs at x4 bandwidth.

Table 4-6 PCI Express Compatibility Matrix for xw8200

	PCI Express x1 Slot (not available)	PCI Express x4 Slot	PCI Express x8 Slot	PCI Express x16 Slot
PCI Express x1 Card	Y	Y	Y	Y
PCI Express x4 Card	N	Y	Y	N
PCI Express x8 Card	N	N	Y	N
PCI Express x16 Card	N	N	N	Y

PCI or PCI Express Removal

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), lay the workstation on its side with the system board facing up, remove the PCI retainer ([page 83](#)), and remove PCI card support ([page 81](#)), if necessary.
- 2 Lift the PCI levers by first pressing down on them and then out.
- 3 Lift the PCI card out of the chassis. If removing a PCI Express card, remove the power supply cable (not illustrated), if required, and move the “hockey stick” lever to release the card and lift it out of the chassis. Store the card in an anti-static bag.
- 4 Close the PCI levers.

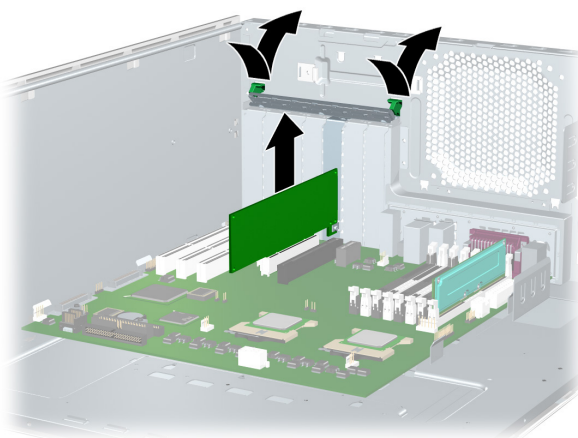


Figure 4-1 PCI Removal

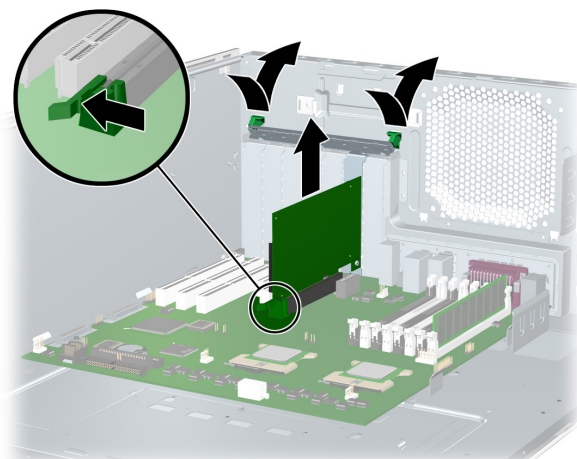


Figure 4-1 PCI Express Removal

PCI or PCI Express Installation

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), lay the workstation on its side with the system board facing up, and remove the PCI retainer ([page 83](#)).
- 2 Lift the PCI levers **1** by first pressing down on them and then out.
- 3 Remove the PCI slot cover **2**.

- 4 Lower the PCI **3** or PCI Express **3** card into the chassis. Verify that the keyed components of the card align with the socket. If installing a PCI Express card, plug in the power supply cable, required.
- 5 Close the PCI levers. If the PCI levers do not close, be sure all cards are properly seated and then try again.
- 6 If installing a PCI Express card, plug in the power supply cable, if required.

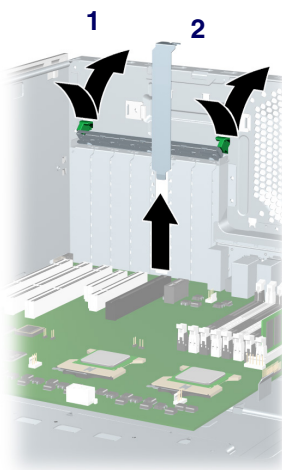


Figure 4-2 PCI Installation

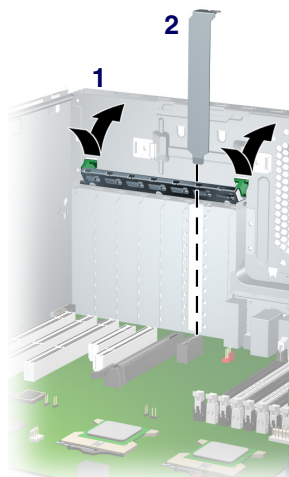
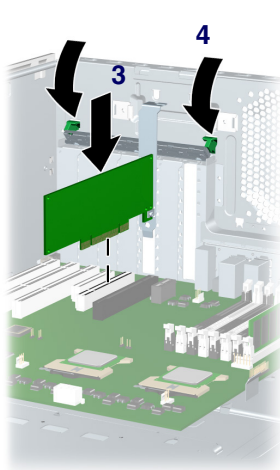
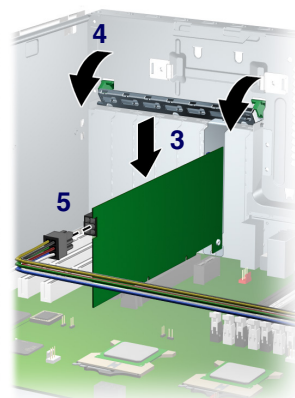
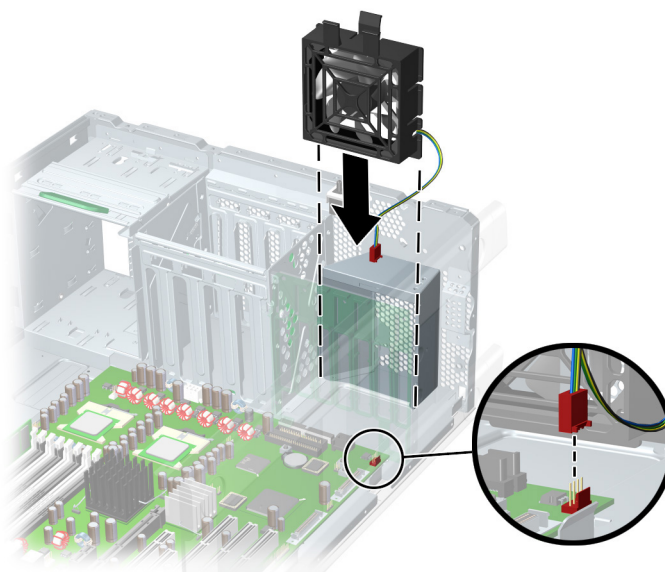


Figure 4-2 PCI Express Installation

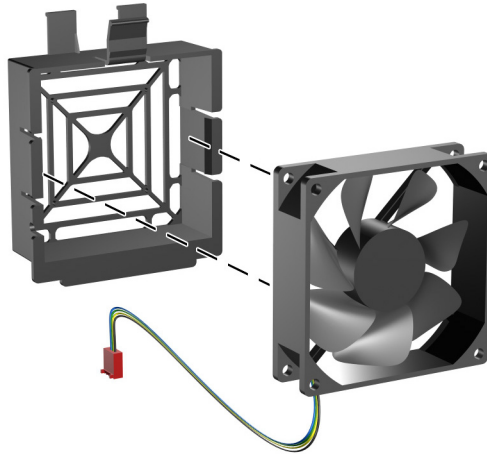


Front Fan Removal (Optional)

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 Disconnect the connector **1** from the header on the system board.
- 3 Unsnap the fan housing from the chassis and lift it out of the workstation.



- 4 Remove the fan from the fan housing by applying outward pressure on the fan housing while lifting the fan away.



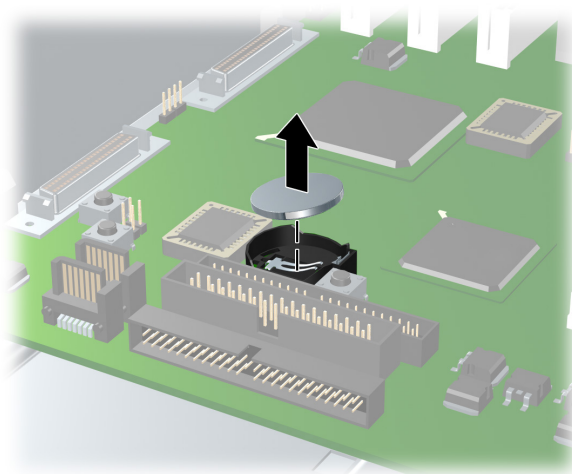
To install the front fan, reverse the previous steps. When installing the fan, it must blow toward the rear of the chassis, so be sure that the airflow direction arrow on the side of the fan housing faces the rear of the chassis.

Battery



CAUTION Before removing the battery, be sure your CMOS settings are backed up as all CMOS settings are lost when the battery is removed. To back up the CMOS settings, use Computer Setup and run the Save to Diskette option from the File menu.

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 2 On the system board, press on the release tab of the battery holder.
- 3 Rotate the battery enough to get beyond the latch and lift it straight up.



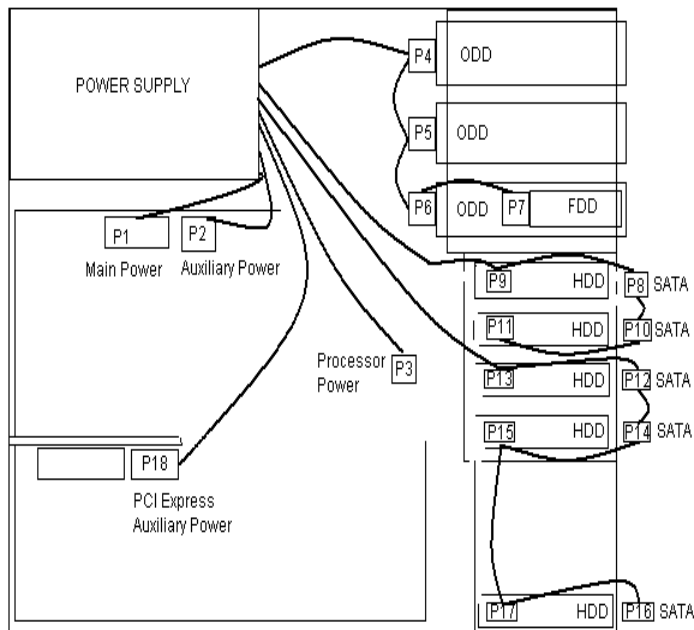
To install the battery slide the battery back in until it snaps back into place.

Power Connections to Drives

For help in identifying power cables, refer to the following information. Route or tie cables so that there is no possible way for them to interfere with the CPU heatsink fans.



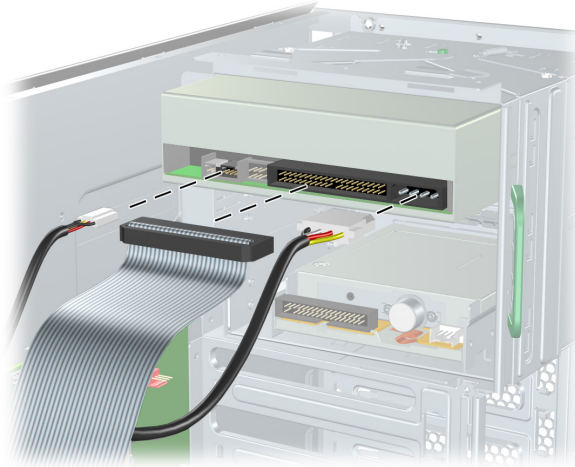
CAUTION Be sure you can differentiate which power cable connects to the PCI Express x16 graphics card and which power cable connects to the system board. These two cables look very similar. The PCI Express power cable has a black connector and the power cable has a white connector. When power is present, you must NEVER connect the PCI Express power cable to the system board. If you do so, the system board may be damaged and your warranty voided. To see a picture of the PCI Express cable and where it must be connected, refer to the “[PCI or PCI Express Installation](#)” section on page 84.



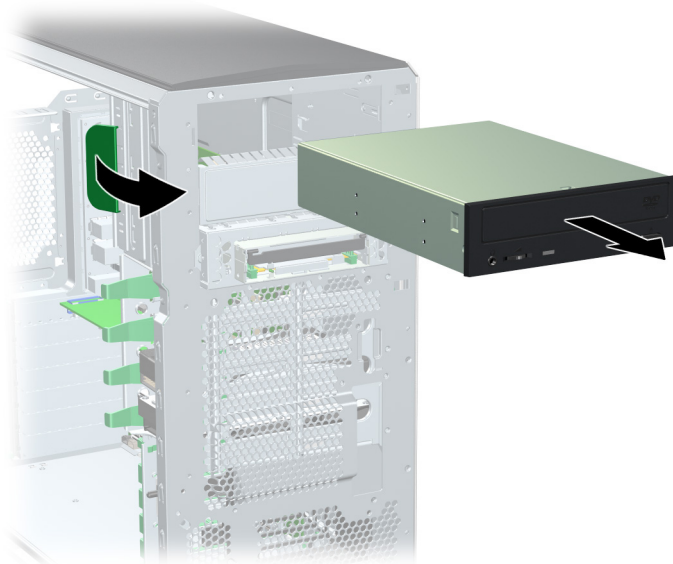
Optical Drive

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and remove the front bezel ([page 71](#)).

- 2 Disconnect the power, drive, and audio cables from the drive. The connector colors may be different than illustrated.



- 3 Lift the green drivelock release lever and gently slide the drive out of the chassis.



To replace an optical drive:

- 1 Lift the green drivelock release lever while sliding the optical drive into the bay. When the optical drive is partially inserted, release the drivelock release lever and slide the drive completely into the bay until the drive is secured.



CAUTION Ensure that the optical drive is secure. Failure to do so can cause damage to the drive when moving the workstation.

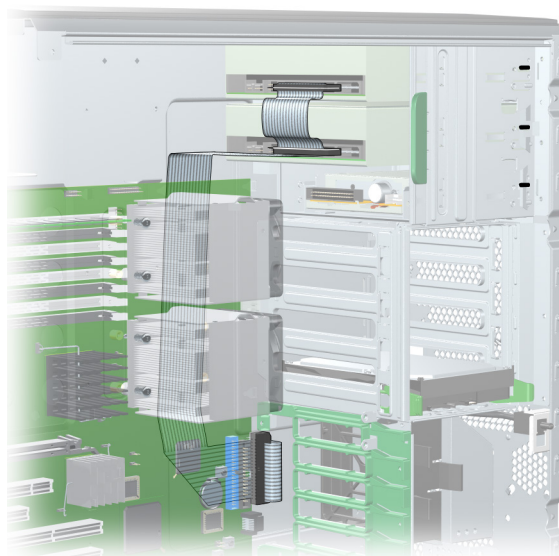
- 2 Connect the power, drive, and audio (if required) cables to the drive and workstation.

NOTE If running a Linux OS, you must connect an audio cable to the optical drive.

If you are installing more than one optical drive, route the cable as in the following image.



NOTE The optical drive cable is routed under the system board.



Replacing Optical Drive Cable

The optical IDE cable is routed behind the system board.

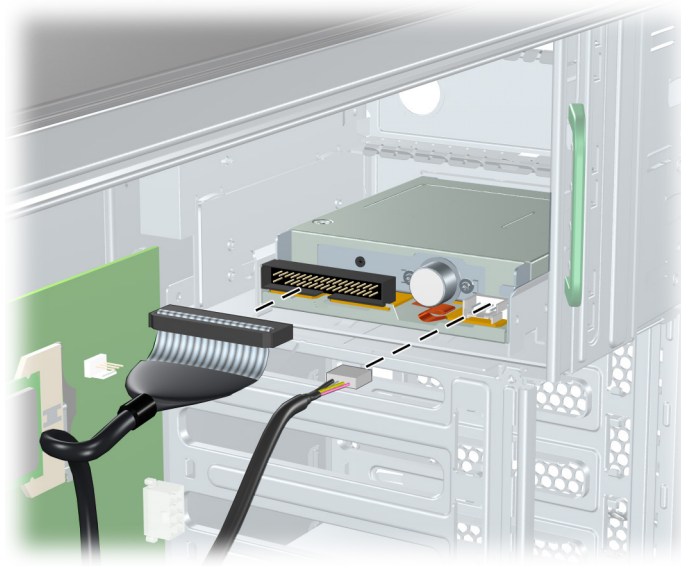
- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), lay the workstation on its side with the system board facing up, remove all expansion boards and graphics cards ([page 84](#)), remove the CPU heatsinks ([page 96](#)), disconnect the optical IDE cable from the system board, and remove the system board ([page 101](#)).
- 2 Remove the plastic ties and tape from the IDE cable, then remove the IDE cable
- 3 Replace the cable and cable ties. Refer to the previous image for cable routing information.

Diskette Drive (Optional)

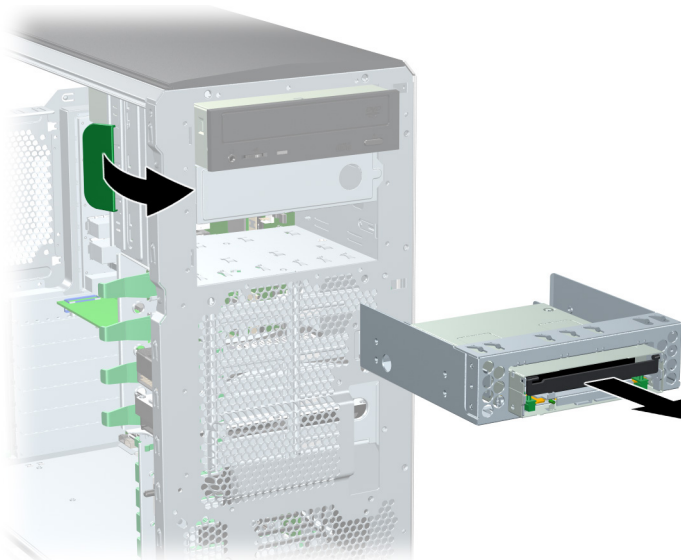
To remove a diskette drive:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and remove the front bezel ([page 71](#)).

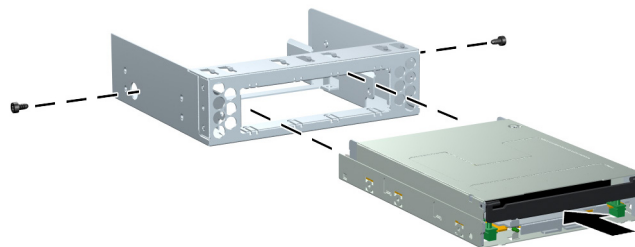
- 2 Disconnect the cables from the back of the diskette drive.



- 3 While lifting the green drivelock release tab, slide the drive forward out of the chassis.



- 4 Remove the diskette drive by removing the two M3 screws in the rearmost holes and sliding the diskette drive from the bracket.



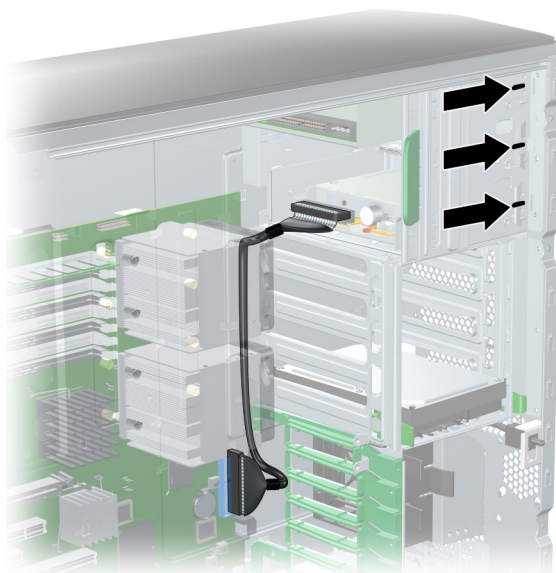
To replace an optional diskette drive:

- 1 Slide the diskette drive into the bracket and secure with two M3 screws.

- 2 While lifting the green drivelock release tab, slide the drive forward into the chassis.
- 3 Route the diskette drive data cable between the system board and the hard drive cage. Your cable might look different than the one shown.



CAUTION The cable must stay between the system board and the hard drive cage. It might be necessary to push the cable down so that it catches on the system board. This routing method is important because you do not want to interfere with the CPU heatsink fans or block airflow.



- 4 Connect the cables from the back of the diskette drive.

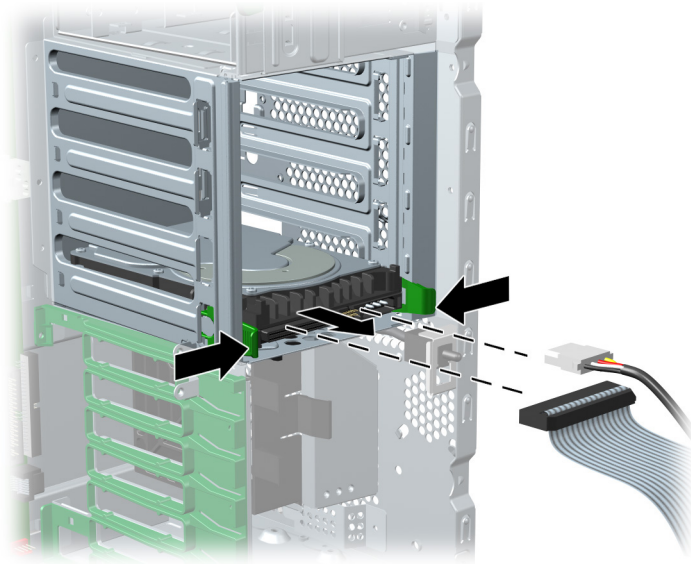
Hard Drive

For information on configuring the integrated SATA RAID, visit www.hp.com/go/workstationsupport and review the white paper on SATA RAID.

Removing a Hard Drive

- 1 Disconnect power from the system ([page 66](#)) and remove the access panel ([page 71](#)).
- 2 Disconnect the cables from the back of the hard drive.

- 3 Push in on the green drivelock release tabs and slide the hard drive out of the chassis.



Installing Hard Drive

This section describes how to install SCSI and SATA hard drives.

- “SCSI” section on page 92
- “SATA” section on page 95

SCSI

For more information on SCSI hard drives, see Appendix B, “SCSI Devices,” on [page 141](#).

Before installing a SCSI hard drive on your system, you must give the hard drive a unique SCSI ID.

All SCSI controllers require a unique SCSI ID (0–15) for each SCSI device that is installed. The reserved and available SCSI ID numbers are displayed in the following list:

- 0 is reserved for the primary hard drive (not reserved for the primary hard drive on Linux).
- 7 is reserved for the SCSI controller.
- 1 through 6 and 8 through 15 are available for all other SCSI devices.

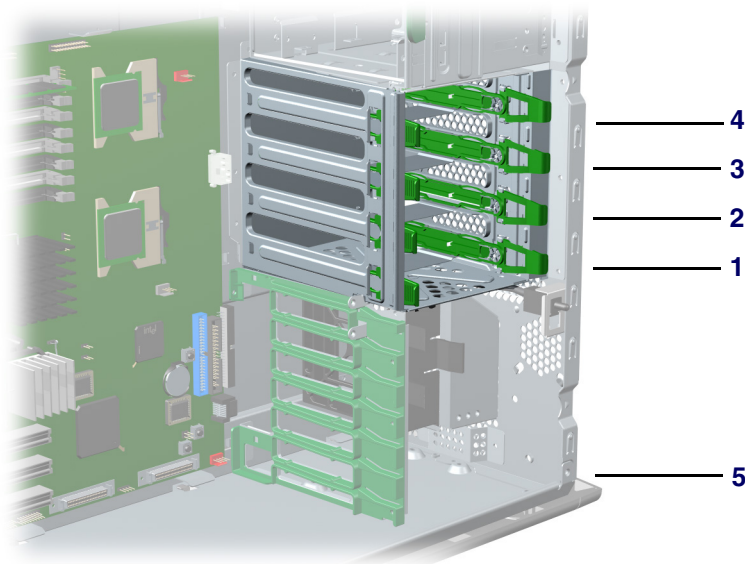
When 0 is used for the primary hard drive, set the second hard drive to 1, the third to 2, and so on.

To set the SCSI ID on a drive, see the instructions on top/back of the hard drive for the correct jumper settings. The drive probably displays a diagram of the jumper block. This diagram shows you which blocks to cover with your jumper to get the desired ID.

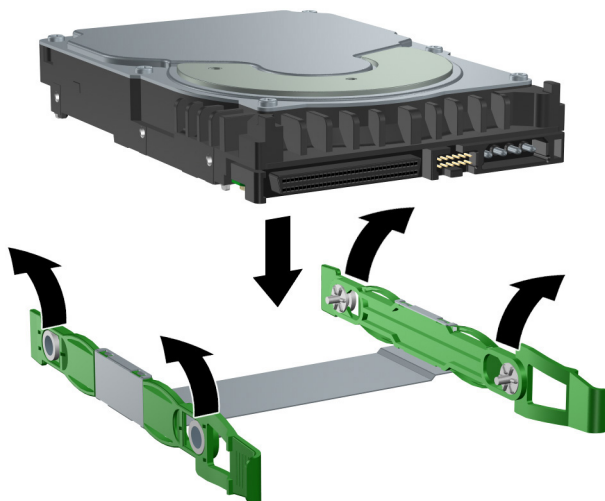
For example, if the drive must be set to 3, the drive might show that the 4 ID bits are at the far left of the connector (ID0, ID1, ID2, and ID3), then using the jumpers provided, cover each block to set the SCSI ID.

After you have given the hard drive a unique SCSI ID, you can install the hard drive into your system.

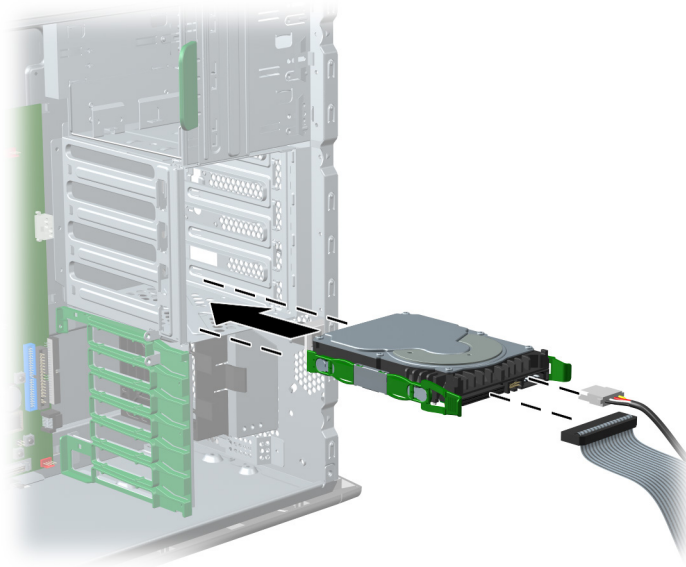
- 1 Select a drive bay in which to install the drive. If installing more than one hard drive, use the hard drive order in the following image.



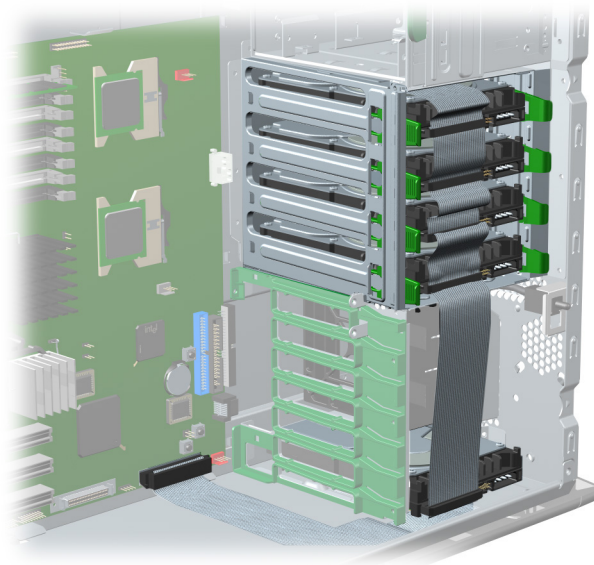
- 2 Simultaneously disengage the green tabs of the rail assembly and slide the rails out of the empty bay.
- 3 Attach the rails to the hard drive by first inserting the hard drive rail assembly pins into one side of the hard drive screw holes. Next, gently flex open the opposite side of the hard drive rail assembly and insert the remaining pins into the holes in the hard drive. If installing the hard drive into bay 5, skip this step.



- 4 Push the drive into the selected bay until it snaps into place. Then attach the power and SCSI cable to the drive.



NOTE If installing a hard drive into bay 5, lay the workstation on its side and remove the three drive screws that are located near bay 5. Insert the drive into bay 5 and align the holes in the bottom of the hard drive with the screw holes at the base of the chassis. Insert the screws through the base and tighten the hard drive to the chassis.



- 5 Connect the data cable to the SCSI1 connector on the system board (see the previous illustration).

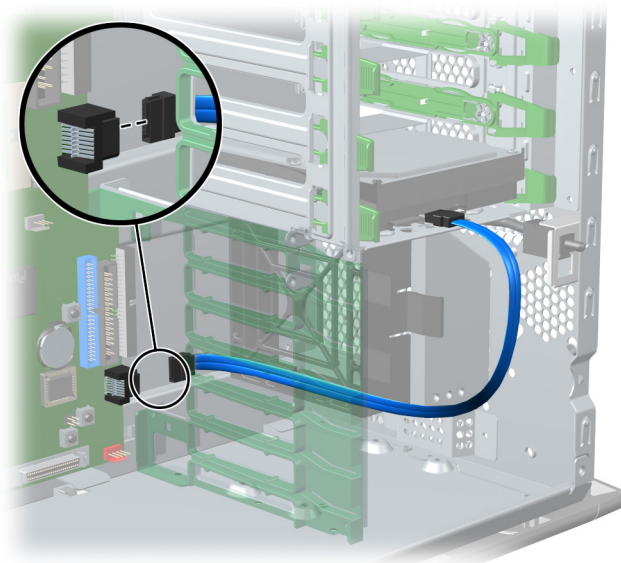
SATA

For information on configuring the integrated SATA RAID, visit www.hp.com/go/workstationsupport and review the white paper on SATA RAID.

For more information on SATA hard drive, see Appendix C, "SATA Devices," on [page 145](#).

To install **one or two** SATA drives:

- 1 Select a drive bay in which to install the drive. Squeeze the green tabs and slide the rails out of the empty bay.
- 2 Attach the rails to the hard drive by aligning the notches with the holes and squeezing it into place (see image on [page 93](#)).
- 3 Push the drive into the selected bay until it snaps into place.
- 4 Attach the power cable and data cable to the drive.
- 5 Connect the data cable to the serial ATA port.



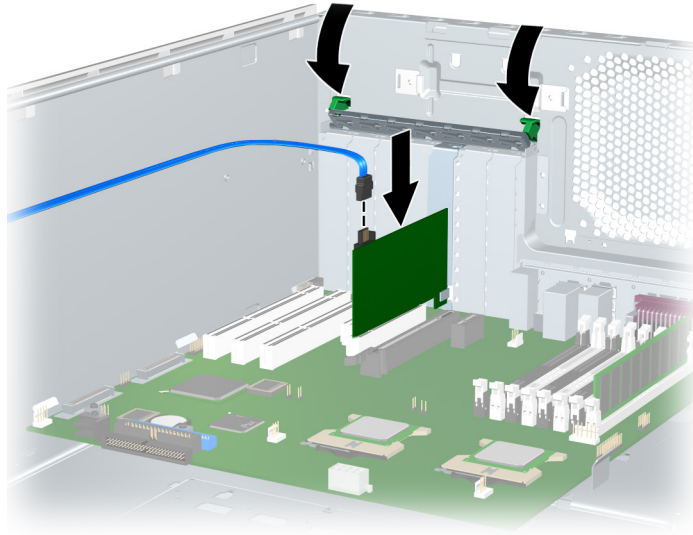
To install **more than two** SATA hard drives:



NOTE If installing more than two SATA hard drives, you must install a SATA controller card.

- 1 Select a drive bay in which to install the drive.
- 2 Squeeze the green tabs and slide the rails out of the empty bay (see image on [page 92](#)).
- 3 Attach the rails to the hard drive by aligning the notches with the holes and squeezing it into place (see image on [page 93](#)).
- 4 Push the drive into the selected bay until it snaps into place.
- 5 Attach the power and data cable to the drive.
- 6 Insert the SATA controller card into an available PCI expansion slot ([page 84](#)).
- 7 Connect the other end of the SATA cable to the SATA controller card.

- 8 Connect one end of the hard drive LED cable to the SATA card and the other end to the system board (see correct location on [page 67](#)).



Processor Heatsink

Removing the CPU Heatsink



NOTE The following illustrated CPU heatsink is typical of what you might have in your workstation. Be aware that different variations of the CPU heatsinks exist, but the overall procedures listed are sufficient to assist you in removing the CPU heatsink.

- 1 Turn on the workstation and enter Computer Setup (F10) ([page 35](#)). Let the workstation run in this mode for five minutes.

This action warms the thermal interface material between the CPU heatsink and processor so that the thermal bond loosens and can more easily be broken.



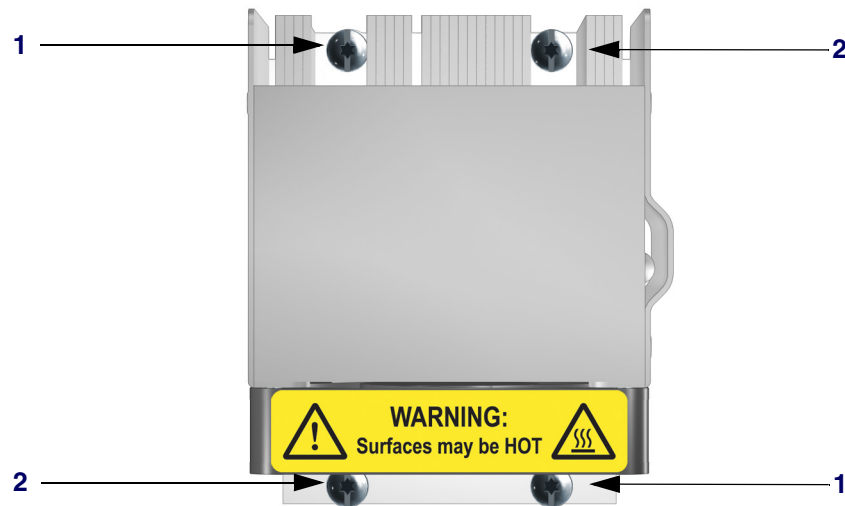
CAUTION If you remove the CPU heatsink while the thermal pad is cold, you could lift the processor out of the socket, even if the socket is closed. This could damage the processor and the processor socket.



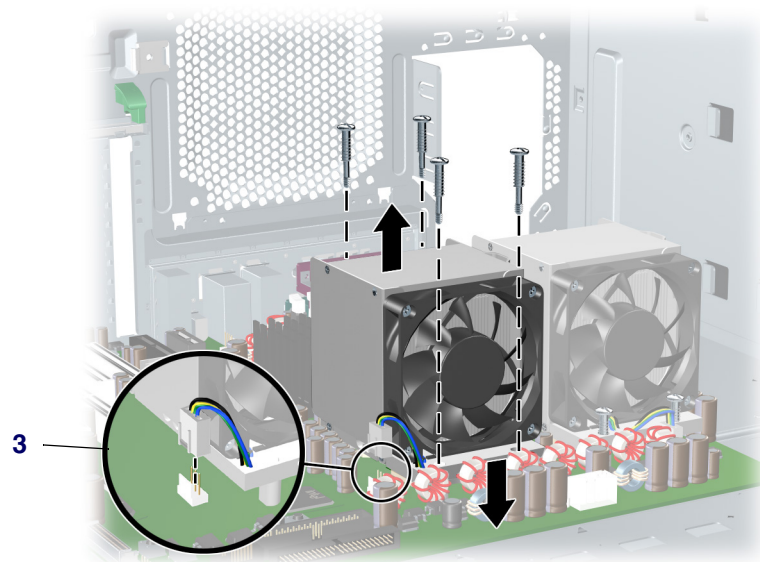
NOTE Windows in idle state does not provide sufficient heat to warm the compound.

- 2 After warming the thermal interface, quickly shut down the system, disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and lay the workstation on its side with the system board facing up.
- 3 Remove the four processor screws slowly, making sure to loosen all the screws evenly. Loosen one pair of diagonally opposite screws **1** until the screw shanks disengage from the system board, then

loosen the remaining pair **2**. Do not fully loosen one screw, then move on to the next. Loosen all of the screws a little at a time, making sure the processor remains level.



- 4** Disconnect the CPU heatsink fan connector **3** from the system board.
- 5** Before lifting the heatsink, carefully break the adhesive compound between the CPU heatsink and processor by rotating the heatsink back and forth.



- 6** Use alcohol and a soft cloth to clean all of the thermal interface material residue from the CPU heatsink and processor.



CAUTION Allow the alcohol on the processor and CPU heatsink to dry completely.

Replacing the CPU Heatsink

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and remove the CPU heatsink ([page 96](#)).
- 2 Use alcohol and a soft cloth to clean all of the thermal interface material residue from the CPU heatsink and processor.

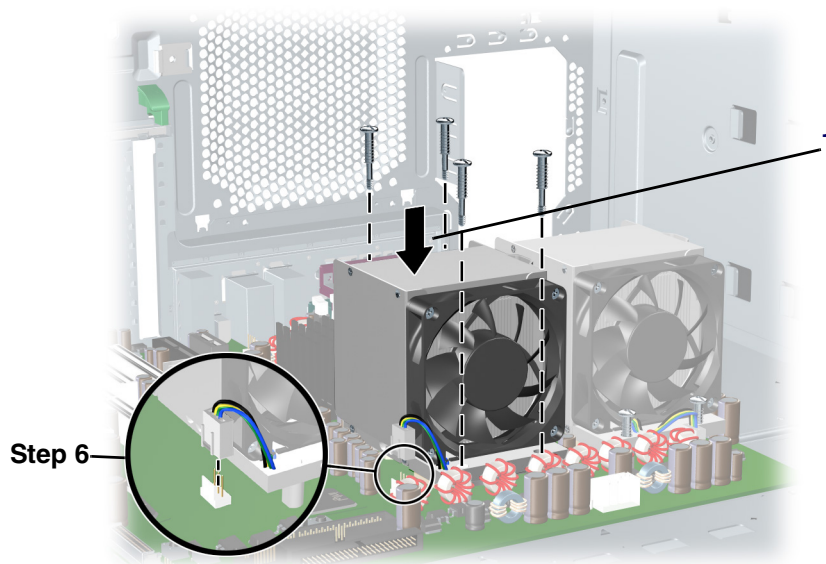


CAUTION Allow the alcohol on the processor and CPU heatsink to dry completely.

- 3 Apply the thermal grease to center of the processor.
- 4 Place the CPU heatsink on top of the processor and align the four mounting screws with the holes **1** in the system board.



NOTE If both CPU heatsinks were removed, be sure all system board standoffs engage with the keyholes in the chassis, be sure the system board connectors engage correctly with the rear I/O panel, and push back on the system board while engaging the CPU heatsink screws with the chassis standoffs. You only need to push back when trying to engage the first screw.



- 5 Screw in the four CPU heatsink screws. First, tighten all of the screws partially so that the CPU heatsink remains level. Next, fully tighten one pair of diagonally opposite screws **1** then fully tighten the remaining pair **2**. Tighten firmly to a torque setting of 6 in-lbs.

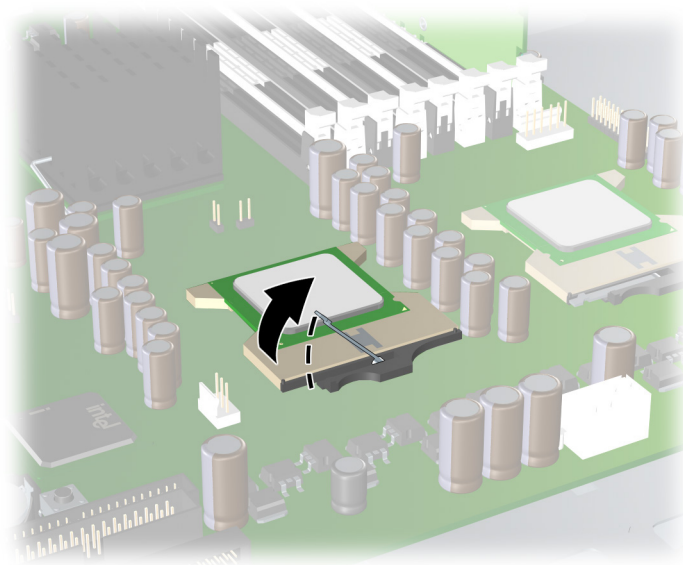


- 6 Connect the CPU heatsink fan connector to the system board.

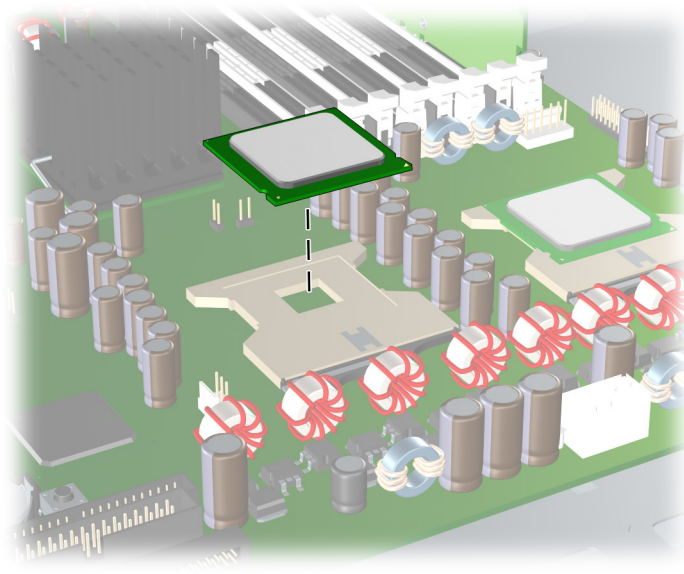
Processor

Removing the Processor

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), and remove the CPU heatsink ([page 96](#)).
- 2 Raise the processor socket handle fully (the full swing angle of the lever is approximately 135 degrees).



- 3 Pull the processor straight out of the socket.



CAUTION Handle the processor carefully. To avoid bending the processor pins, keep the processor perfectly flat when removing and storing it.



NOTE Store the processor in a safe place where it will not be damaged. If you are permanently removing a second processor, check your OS documentation to determine if you should change any OS settings to disable multiprocessor support or enable Hyper-Threading support.

Replacing the Processor

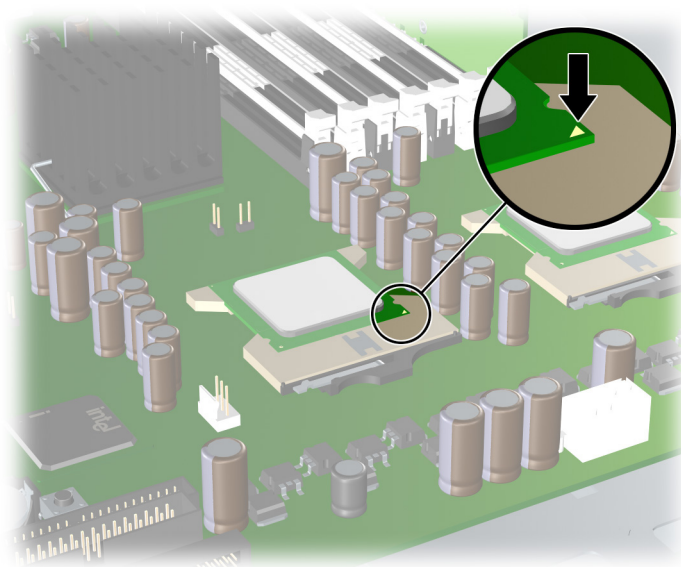
- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), remove the CPU heatsink ([page 96](#)), and remove the processor ([page 99](#)).
- 2 Raise the processor socket handle fully (the full swing angle of the lever is approximately 135 degrees).



CAUTION Processor pins are delicate and bend easily. Use extreme care when placing the processor in the socket.

- 3 Line up the triangle on the top of the processor with the triangle on the corner of the processor socket and install the processor into the socket. Ensure that the underside of the processor is level with the

top of the processor socket. Lightly press down on the top of the processor while closing the socket lever.



- 4 Check for proper processor seating in the socket by carefully trying to lift the processor out of the socket with your fingers. A properly seated processor does not lift out of the socket.

System Board

To remove the system board:

- 1 Disconnect power from the system ([page 66](#)), remove the access panel ([page 71](#)), lay the workstation on its side with the system board facing up, remove all expansion boards and graphics cards ([page 84](#)), and remove the CPU heatsink ([page 96](#)).
- 2 Disconnect all cabling from the system board.



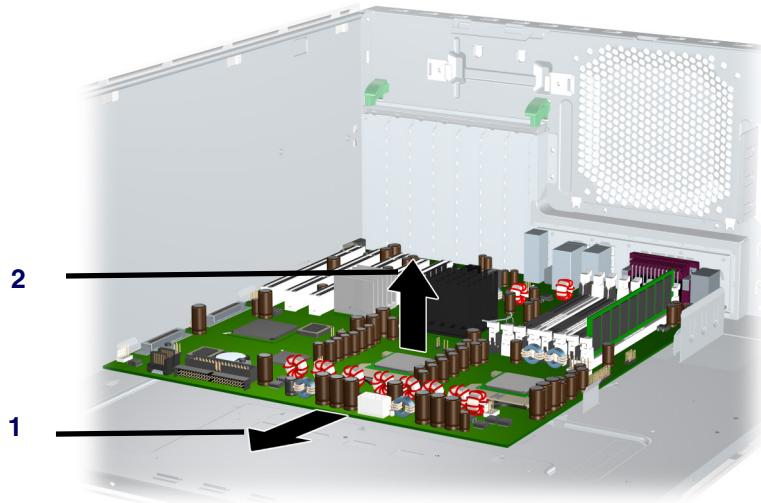
CAUTION Be sure you can differentiate which power cable was disconnected from the PCI Express x16 graphics card and which power cable was disconnected from the system board. These two cables look very similar. The PCI Express power cable has a black connector and the power cable has a white connector. When power is present, you must NEVER connect the PCI Express power cable to the system board. If you do so, the system board may be damaged and your warranty voided. To see a picture of the PCI Express cable and where it must be connected, refer to the “[PCI or PCI Express Installation](#)” section on [page 84](#).



NOTE Make note of the cable connections before disconnecting them from the system board. Refer to “[Power Connections to Drives](#)” section on [page 87](#) for more information.

- 3 Slide the system board forward **1** to disengage the plastic mounting standoffs from the chassis.

- 4 Lift the system board out **2** of the chassis, being careful not to damage the cables and rear panel connectors.



To replace the system board:

- 1 Insert straight down and make sure all system board standoffs engage with the keyholes in the chassis.



NOTE Be sure the system board connectors engage correctly with the rear I/O panel.

- 2 Push back while maintaining downward pressure on the board, so all standoffs remain engaged.



NOTE You only need to push back while engaging the first screw.



WARNING! The system board is not secure until the CPU heatsinks are installed.

- 3 Install the heatsink ([page 98](#)).